
Configuration guidelines

Assignment procedures

When assigning actual data terminations to specific network loops, place each end of a potential call path on separate loops. You can do this by placing computer ports on separate loops from outgoing trunks and placing terminals and inbound modem pool terminations on different loops. Inbound and outbound modem pool terminations can be on the same loop since no timeslot path exists between them. These guidelines are independent of the size of the Meridian 1. On multiple network group systems (VL, VLE, XL), you should still try to minimize junctor traffic between groups. You can do this by placing all data traffic in the same network group.

Note: Engineer the routing of data calls carefully because certain modules (that is, AIM) do not give warning tones and any alternate routing signals Network Alternate Route Selection/Basic Alternate Route Selection (NARS/BARS) are not available to warn the user that the module is connected through on an expensive route.

Assignment of peripheral equipment and common equipment for the overall system in which the Meridian data features is implemented should be done according to the procedures given in *Meridian 1 system engineering* (553-3001-151).

When assigning equipment indigenous to data, carefully consider the impact this feature places on the overall system capacity and on equipment planning.

Operating parameters

The Meridian data features can be implemented in any Meridian 1 system. The capacity of each Meridian 1 is subject to five independent constraints. To include data, compensate for these constraints, which are listed as follows:

- Memory capacity
- Real-time capacity
- Network traffic capacity
- Network terminating capacity
- Configuration limits

Any of the above factors can limit system size gives the actual system capacities and limits for each Meridian 1 *Meridian 1 system engineering* (553-3001-151).

Memory requirements

The Meridian data features has no effect on the storage requirements of the system software program. When assigning each ADM or MCDS-AC or AIM and its data calling features, however, the protected and unprotected data storage requirements are the equivalent of those for a telephone and its assignable features. See *Meridian 1 system engineering* (553-3001-151).

Real-time requirements

The maximum real time available in each Meridian 1 is 2100 seconds. Depending upon the calling applications, data traffic characteristics can produce a wide range of real-time requirements. That is, a data call from an inquiry-based system could have a short holding time and high call attempts, thus using more real time than an interactive computer application where holding time is long and call attempts are low.

Real-time use by the Meridian data features is dependent upon the types of data calling applications accommodated as well as the number of all data call attempts made. Do the following to assess whether sufficient real time will be available for a particular data application:

- Estimate the number of average busy season busy hour (ABSBH) data call attempts (including blocked, busy, and unanswered calls) for each type of data call (that is, calls to terminals, computer ports, and outgoing trunks).
- Multiply the number of each type of data call by the real time for each type.

Note: A data call attempt produces the real-time equivalent of a voice call attempt. See *Meridian 1 system engineering* (553-3001-151).

- Call to a data terminal = 1 intra-office call
- Call to a computer port = 1 intra-office call
- Call to a remote computer = 2 intra-office calls + 1 trunk call (Outgoing Modem Pool call)
- Call from an Incoming Trunk to a modem pool = 1 trunk + 1 intra-office call (Incoming Modem Pool call)
- Take the total data real time calculated from the previous item and add this sum to the total real time required for voice call processing (as calculated from *Meridian 1 system engineering* (553-3001-151)).
- The total real time required for successful calls (both voice and data) should be less than 2100 seconds.

Note 1: No features are included in the above measurements.

Note 2: Measurements for an ADM and an SL-1 telephone are equivalent; calls to a trunk (Outgoing Modem Pool call) are made from the Prime Directory Number (PDN) of the ADM's companion SL-1 telephone, and the above measurements apply.

Note 3: Three individual calls constitute a complete Outgoing Modem Pool call setup. The above measurements reflect real time required for each call. Therefore, the sum of 2 intra-office calls + 1 trunk call = 1 complete Modem Pool call real-time measurement.

Note 4: Two individual calls constitute a complete Incoming Modem Pool call setup. The above measurements reflect real time required for each.

Network traffic requirement

Each network loop is capable of the maximum traffic capacities given in Table 3. With the inclusion of the Meridian data features, consider the data line usage in the calculations required to determine the total network traffic requirements.

Consider data calls to terminals or computer ports as intra-office calls. Modem Pool calls, once established, constitute one intra-office call plus one outgoing-originating trunk call. Total data usage is the product of the average number of calls multiplied by the average holding time.

Performing the following calculations yields the total data usage figure:

$$\text{TOTAL DATA USAGE} = (A + B) \times 2$$

where A = the number of data calls to terminals, computer ports, or both, times the estimated holding time and B = the number of Modem Pool calls times 2 times the estimated holding time.

Note: Convert the results of the above calculations to CCS in the following ways:

- If the total data usage is expressed in minutes, multiply by 60 and divide by 100.
- If the total data usage is expressed in hours, multiply by 36.

Two basic traffic definitions stated in *Meridian 1 system engineering* (553-3001-151) now include data traffic contributions as follows:

- Line CCS = Incoming Terminating CCS (voice)
 - Outgoing Originating CCS (voice)
 - Terminating Intra-office CCS (voice)
 - Originating Intra-office CCS (voice)
 - Originating ADM CCS (data)
 - Terminating ADM CCS (data)
 - Outgoing Modem Pool Call CCS (data)
- Intra-office Ratio (R) = Terminating Intra-office CCS (voice)
 - Originating Intra-office CCS (voice)
 - Originating ADM CCS (data)
 - Terminating ADM CCS (data)
 - Line CCS

In these modified traffic definitions, total line CCS consists of all voice line calls plus all ADM CCS and actual trunk CCS associated with a Modem Pool call. Therefore $\text{Total Loop CCS} = \text{Total Line CCS} \times (2 - R)$.

Using the traffic definitions stated above when Meridian 1 data is implemented, you can determine the network CCS and the required network equipment for the system using *Meridian 1 system engineering* (553-3001-151).

Termination requirement

Each peripheral equipment (PE) shelf accommodates 10 line or trunk circuit packs, or both, and each network loop interfaces with a maximum of four PE shelves. (The number of Digitone receivers supplied is not included in this figure.)

The Data Line Card (DLC) used with the Meridian data features supports two data lines and two voice lines. A maximum of four DLCs can be installed in each PE shelf. This allows a maximum of 32 data lines per network loop (four PE shelves).

Each voice-line circuit pack (QPC60, QPC61, and QPC353) supports 4 voice lines, and a total of 160 lines (4 lines x 10 cards x 4 PE shelves) can be installed per network loop. When 4 DLCs are installed per network loop, the voice-line terminating capacity becomes 128 (4 lines x 6 cards) + (2 lines x 4 cards) x (4 PE shelves) per network loop. Of this total voice-line terminating capacity of 128, one line unit of a Modem Pool Line Card (MPLC) is required to provide a Voice Frequency Directory Number (VFDN) for each modem associated with a modem pool ADM. **(The MPLC and the VFDN are not used if the AMP feature is active.)** Since the MPLC supports only pooled modems, the total loop terminating capacity for voice lines used for voice traffic becomes $128 - 4n$ (where n = the number of MPLCs). The trunk terminating capacity per network loop is 80 (2 trunks per trunk card x 10 cards x 4 PE shelves). There can be an arbitrary mixture of lines and trunks per loop, but the number of data lines can never exceed eight (4 DLC) per shelf.

Configuration parameters

The configuration of a Meridian 1 system that has Meridian data features is flexible within the constraints specified in the *Meridian 1 system engineering* (553-3001-151). A system may not be able to accommodate all of the maximum values given in that table because of system limitations on the real time, total memory, or network traffic capacity.

Modem pool and computer port allocation

Through use of the ADM, voice-grade modems and computer ports can be allocated on a contention basis; that is, dedicated connections from terminals to voice-grade modems, computer ports, or both, can be eliminated as customers' data applications permit.

In general terms, the following procedures provide contention for computer ports:

- Connecting a stand-alone ADM to each computer port
- Assigning the Data Directory Number of each ADM connected to a computer port to a single hunt group

Note: When the AMP feature is used, there is no need for separate modem pools. With the Data Port Hunting feature, the DDN of each Data Port is assigned as a trunk and is hunted as a trunk group.

Contention for voice-grade modems is accomplished by configuring a modem pool.

Outbound modem pool

In general terms, configure a modem pool through the following procedure:

- Connect each voice-grade modem to a stand-alone ADM on the inbound (digital) side.
- Connect the outbound (analog) side of each of these modems to a unit on a MPLC.
- Assign the DDN of each ADM connected to these modems to a single hunt group.

Inbound modem pool

In general terms, configure a modem pool through the following procedure:

- Connect each voice-grade modem to a stand-alone ADM on the outbound (digital) side.
- Connecting the inbound (analog) side of each of these modems to a unit on a 500-set line card.
- Assign the DDN of each line card connected to these modems to a single hunt group.

Modem pool calculations

Determine the number of pooled modems and computer ports according to a grade of service (GOS) selected by the customer. (This GOS applies to the availability of these service facilities, not to the GOS of the overall system.)

If no Ring Again queuing is desired, the service facility GOS is a specified blockage level. When no queuing is provided, the length of the call does not affect the blockage level.

If the Ring Again queuing is desired, then the service facility GOS is specified as an average queuing time (that is, delay time). When queuing is provided, the length of the call does affect the GOS. As the average call length increases, the amount of traffic that can be carried decreases for the same GOS.

To determine the required number of computer ports or modems in each modem pool, use the following procedure:

- 1 Estimate the number of successful calls to the service facility per hour (that is, the average busy season busy hour).
- 2 Multiply the average holding time (in CCS) per data call by the total calls calculated in Step 1. The product equals the total traffic offered to the service facility.
- 3 Using the total traffic offered and the desired GOS, determine the required number of modems or computer ports by referring to Tables 4 through 25.

Note: When more than one modem pool is to be provided and each pool supports different services (for example, differing transmission speeds), this procedure should be used to size each modem pool.